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illicit process taints them all. We must discard the whole lot, or else remand them to the chapter headed "Fallacies."

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BERKELEY, CALIFORNIA.

SOCIETIES

NEW YORK BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

THE New York Branch of the American Psychological Association met in conjunction with the Section of Anthropology and Psychology of the New York Academy of Sciences on Monday, November 27. An afternoon session was held at the Psychological Laboratory of Columbia University, and an evening session at the American Museum of Natural History. Members dined at the Faculty Club, Columbia University. The following papers were read:

Correlations of Association Tests: R. S. WOODWORTH.

Preliminary results with the tests of controlled association prepared by Woodworth and Wells indicate rather high correlation between the tests of similar performances.

Experiments in Progress at the University of Illinois: S. S. COLVIN.

This paper reports some of the typical experiments now in progress and partly completed, but not as yet published. One of the most extensive of these is the attempt to discover the effect of learning certain motor activities on the learning of other similar activities. It differs principally from other studies on the transfer of training in the large number of subjects who participated and in the attempt to isolate the factors of accuracy and rapidity. The experiment has been conducted in two sections, the first with about 300 children of the practise school of the Charleston (Illinois) Normal School, the second with about 1,800 children in the grade schools of Bloomington, Illinois. While the results have by no means been worked out, as far as they go they show that while there is a positive transfer effect from the practise series to the test series in accuracy, the opposite is true in regard to rapidity. The test also clearly indicates the necessity of running a series of check experiments in interpreting the results.

Another study attempts to test whether it is better to learn a given task at one sitting or at several. The material used in one test was nonsense syllables. These were learned in one, two, three, and four periods, respectively. The results showed that it made absolutely no difference as to which method was employed. The test is

now being conducted with poetry as the memory material. A positive result that has so far been discovered is that there is a high positive correlation between immediate recall and recall 24 hours later. The subjects used were about 600 children in the grammar grades of the Champaign public schools.

A third test with school children, also conducted in the Champaign schools, has shown that while whispering is an aid to learning nonsense material, writing is a hindrance up to the sixth grade.

An experiment to discover the extent of children's vocabularies indicates that they are more extensive than ordinarily exposed.

Another experiment investigates the efficiency of spatial discrimination under varying degrees of brightness intensities. Among the interesting results appears the fact that there are two maxima of discriminative efficiency, a relative maximum with an illumination of about two-candle-power illumination, and an absolute maximum when employing 32-candle-power illumination. Probably the factors of attention and habituation explain respectively the two maxima. The experiment is to be continued with chromatic lights and a similar test is to be made in regard to sound.

Reaction Time to Different Retinal Areas: A. T. POFFENBERGER, JR.

In the course of an experiment in which light stimuli falling upon different regions of the retina were reacted to by either the right or the left hand, certain differences appeared. This report includes: (1) the differences in the time of reaction by the hand when the light stimulus strikes the center of vision, and points 10, 30, and 45 degrees from the fovea in a horizontal plane; (2) a comparison of the reaction times resulting from a stimulation of one eye and of both eyes. All differences were based on averages of 400 reactions and have a very low probable error. In the two subjects tested, the times increased as the distance from the fovea increased, and in all cases the reaction of the nasal side of the retina was faster than of the temporal side. Comparison with other retinal peculiarities suggests that the differences found are due to conditions in the retina rather than to differences in the speed of the central process. The reaction time upon stimulation of both eyes was faster by about .015 second than in the case of one eye, a difference due probably to the speed of transmission through the nerve centers.

Some Experiments in Incidental Memory: G. C. MYERS.

Subjects were asked to draw from memory a representation of the size of a dollar bill; to choose from a series of circles those representing the size of the respective common coins; to represent a watch-dial with Roman notation.

Of the 500 subjects (business men and students and pupils from

the university to the third grade public school), 15 overestimated the length, 88 subjects overestimated the width. In both the cases the average underestimation was very much greater than the average overestimation. All of the 117 subjects who corrected for length increased it, and all but 2 of the 124 subjects who corrected for width increased it. As a result of this finding, tests are in progress on "image measuring."

The males, as a rule, did better than the females. Of the 50 country-school teachers and 30 high-school students, however, the females did noticeably better than the males. In the watch experiment, out of 198 cases, all but 19 wrote "IV" and all but 8 wrote "VI." In the coin test the general tendency is to overestimate the large ones and to underestimate the small ones. A number of other tests now in progress were mentioned.

Visual Acuity with Lights of Different Colors and Intensities: D. E. RICE.

The comparatively recent development of illuminants of high intrinsic brightness, with the attendant variations in hue, has given a new importance to the question of visual acuity.

The proper conservation of the eyesight of those who must work almost constantly under artificial illumination makes it desirable to know what intensities and colors of illumination are best adapted to give the eye its highest efficiency.

In the study of this question two points are obviously of vital importance—namely, the exact determination of the intensities and the character of the test used to measure the acuity.

Many complicating factors enter into the problem, among them being the following: the state of adaptation of the eye; the varying sensitivity of different parts of the retina to lights of different colors in different states of adaptation; the influence of accommodation, involving the chromatic aberration of the eye; size of pupil; individual differences, including variation in sensitivity to different colors, and variations in the dioptric system of the eye.

These factors, together with the failure to determine accurately the intensities of the lights used, and the employment of different types of tests, are responsible for the wide variations which are to be found in the conclusions of different observers.

The present investigations indicate that red gives a considerably higher acuity than green, and that white may be either more or less efficient than red, depending largely upon individual differences, and upon the predominance of the long or short wave lengths.

With all lights the acuity curve rises rapidly with increase in illumination until an intensity of from one to two meter candles is

reached, after which large increases in intensity are accompanied with relatively slight increase in acuity.

Unit acuity with white light is reached at an intensity of from 25 to 35 meter candles.

The following explanation is suggested to account for the higher acuity with red illumination. Various facts seem to indicate that the cones of the retina, which are concerned in the perception of form, are more sensitive to radiations of longer wave length, while the rods are relatively more sensitive to shorter wave lengths. It appears also that there is to some extent rivalry between the brightness sense and the form sense. With red illumination, therefore, cone vision has the advantage, resulting in enhanced perception of form.

The Action of Pharmacological Agents as an Aid in the Classification of Mental Processes: H. L. HOLLINGWORTH.

Many attempts have been made to make out correlations in efficiency in various mental and motor tests with a view to their classification on the basis of function or process involved in their performance. Low correlations have usually been found between tests that seem to have many elements in common. These low correlations perhaps result from specialized skill in certain analogous performances, or in individual differences in method of performing the task assigned. The speaker presented results showing that tests can be usefully classified on the basis of the character of the influence of such a pharmacological agent as caffein. With respect to the character of the drug effect, the action time and persistence of this effect, the tests employed at once fall into groups, the members of which resemble each other. It was suggested that this resemblance pointed to similarity of process, function, or nervous mechanism involved in performance of the tasks. Individual differences in the method of performance (revealed in the introspections) are also reflected in the character and time relations of the drug effect.

Reactions to Simultaneous Stimuli: J. W. TODD.

One hundred reactions were obtained from each subject to each of the following arrangements of stimuli of medium intensities: to single light, electric shock, and sound stimuli; to the following simultaneous stimuli with instructions to react to the first-named member of the pairs and groups: light and sound; sound and light; light and electric shock; shock and light; sound and shock; shock and sound; light, shock, sound; shock, sound, light; sound, shock, light.

The following conclusions are based upon the data:

1. The reaction-time to a pair of simultaneous stimuli is shorter than the reaction-time to either member of the pair presented alone.

2. The reaction-time to three simultaneous stimuli is shorter than that to a pair of stimuli.

3. The addition of another stimulus to one or to two stimuli reduces the reaction-time, and reduces it in accordance with the reaction-time to the stimulus added, *i. e.*, the addition of sound, which produces the shortest reaction-time, brings about the greatest reduction; the addition of the electric shock causes less reduction, while the addition of light, which produces the longest reaction-time, produces the least reduction.

On the Relation of Quickness of Learning to Retentiveness: DARWIN

OLIVER LYON.

Close inspection shows the problem to be a very elaborate one. Not only must we settle it for various *classes* and *ages*, but we must use various *methods* of learning and, most important of all, various *kinds* and *lengths* of material. When it comes to the problem of ascertaining the subject's degree of retentiveness, various methods present themselves. Of these the two used chiefly in this work have been: (1) to have the subject write down, after a certain number of days, as much of the material as possible, and measure his retentiveness by the work produced; (2) to supply the subject with the original material and take his time for the relearning of it. Each method has its advantages and disadvantages, a discussion of which can not be undertaken in this summary. Suffice it to say that although the second method has the advantage of supplying us with an easy and accurate form of measurement, it is a question if it is a fair one to use in settling the question in hand, in that this method introduces the factor of "relearning." The method of correlation used with the second method is also open to criticism, for it may be said that it is incorrect to compare two men as having the same degree of retentiveness, one of whom takes 25 minutes to learn a passage and who one week later takes 5 minutes, and another who takes 10 minutes and three weeks later only 2 minutes, even though each may be said to have saved four-fifths of the time originally spent. A combination of both methods was used in this work by having the second method follow immediately upon the first.

The popular impression among the laity is that the slow but steady worker, even though dull, remembers his work better and longer than the more brilliant student—a corollary of which is that those who learn the quickest forget the quickest. However, in so far as reliable statistics have been gathered, it has been found that in general the most rapid learner is also the best retainer. Examination of the class records of the 132 students tested at the State Normal College at Albany also proved that the students who rank highest in their classes and who can be classed as "the most intelli-

gent" have, as a rule, the best memories. A complete expression of the various results obtained with the various methods and materials used is obviously here impossible. Generally speaking, we may say that those who learn quickly remember longest if the material memorized is "meaningful" or "logical," but that they forget quickly if the material is such as involves the memorizing of motor associations, as is generally the case with digits, words, and nonsense syllables. This statement, however, needs many modifications. Thus, for example, with *prose* the ratio is not nearly so marked by the second method as it is with the first. With several sets of students it was even reversed. *Words* are certainly more "meaningful" than nonsense syllables; yet by the second method the ratio is found to be more pronounced for words than for nonsense syllables or digits, *i. e.*, the percentage of time lost by the fast learners is greater than that lost by the slow learners; and though this is true for digits also, it seems to be more true for words. For nonsense syllables (which one would think were material *par excellence* for the memorizing of motor associations) the ratio is not nearly as high as it is for digits and words. Although averaging the two methods gives a positive correlation for both *prose* and *poetry*, the second method taken alone does not always do so. This is especially so in the case of *poetry*, where the second method almost invariably gives the result that the fast learners have forgotten more than the slow ones. We are led to suspect that the explanation lies in the fact that in the memorizing of poetry *rhythm* is a most important factor. Taking all methods and materials into consideration, we can state quite positively that the amount of difference in retentiveness between the fast learner and the slow learner is much less than is generally supposed.

The rather large mass of data obtained supply us with many rather interesting implications. (1) The retentiveness of men was found in general to be superior to that of women. (2) Individuals differ more in quickness of learning than in retentiveness. (3) The first method gives a truer index of retention than does the second, and would be more desirable were it capable of perfect measurement. (4) Memory in the main runs parallel with intelligence and there is a positive correlation between memory and scholarship. (5) This is more marked where the material is of a "logical" or "intelligible" nature, and a good memory for digits, words, nonsense syllables, sounds, colors, etc., does not necessarily go hand in hand with great intelligence. (6) With the same individual, slow learning gives greater retentiveness than does fast learning. (7) With the same individual, retentiveness is greater if the material is memorized as a whole than if memorized in parts. (8) Among the best learners those who learn the nonsense syllables rhythmically are not the best

retainers. (9) The retention of ideas is increased by seeing that no mental work, especially work of a similar nature, is allowed to follow the memorizing. (10) Auditory and mechanical learning make recall *prompt* and *rapid*, but the *amount* recalled is generally less.

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REVIEWS AND ABSTRACTS OF LITERATURE

The Mediæval Mind: A History of the Development of Thought and Emotion in the Middle Ages. HENRY OSBORN TAYLOR. Two volumes. London: Macmillan and Co. 1911. Pp. xv + 613; 589.

So far as the present reviewer is aware, Mr. Taylor's enterprise is in many important respects a novel one. His is not merely a new and improved version of standard presentations, but a fresh and highly ingenious attempt to supply the thoughtful reader with those various kinds of information in regard to the Middle Ages which he may be expected to crave and which he would look for in vain in the innumerable learned treatises on medieval history. The writer would make us feel "the reality of medieval argumentation, with the possible validity of medieval conclusions, and tread those channels of medieval passion which were cleared and deepened by the thought." To feel these is obviously "to reach human comradeship with medieval motives, no longer found too remote for our sympathy, or too fantastic or shallow for our understanding." That the accepted routine of medieval history does not accomplish this end is patent enough to any one who has sought to understand the Middle Ages. As Mr. Taylor says, "We must not drift too far with studies of daily life, habits and dress, wars and raiding, crimes and brutalities, or trade, and craft and agriculture. Nor will it be wise to keep too close to theology or within the lines of growth of secular and ecclesiastical institutions. Let the student be mindful of his purpose (which is my purpose in this book) to follow through the Middle Ages the development of intellectual energy and the growth of emotion. Holding this end in view, we shall not stray from our quest after those human qualities which impelled the strivings of medieval men and women, informed their imaginations, and moved them to love and tears and pity."

It might seem at first sight that if once the historian deserts those seemingly staunch foundations of political, economic, and institutional history, he will be forced to choose between a history of medieval literature or of philosophy, or run the grave danger of lapsing into scattered reflections and personal impressions detached from the solid earth of chronicled fact and event. Mr. Taylor has done none of these things. He has not written a history of literature or philosophy, nor has he at any point lost his moorings and drifted about the vague and eventless sea of haphazard generalization. Before proceeding to give a somewhat careful analysis of the volumes, which is the only way of forming a correct